

# Yocto KICKstart

 Currently only for Intel SoC / FPGA with external DDR

## Table of contents

The Yocto Project is a set of tools that helps to create customized Linux systems. This is a short description of how to prepare the host computer and how to create a project with yocto.

- 1 Used source files
- 2 Build Host
  - 2.1 General requirements
  - 2.2 (optional) VM with supported Linux OS
- 3 Install Yocto Project
- 4 Create a project for an Intel SoC/FPGA device
- 5 References
- 6 Table of contents

## Used source files

The following description was tested with the source files listed in this table:

| Component            | Source                                                                                                                        | Version/Git branch  | Commit ID                                |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------|
| Oracle VM VirtualBox | <a href="https://www.virtualbox.org/">https://www.virtualbox.org/</a>                                                         | 6.1.26              | ---                                      |
| Ubuntu 20.04 LTS     | <a href="https://releases.ubuntu.com/20.04/">https://releases.ubuntu.com/20.04/</a>                                           | 20.04.3 LTS         | ---                                      |
| Yocto                | <a href="https://git.yoctoproject.org/cgi/cgit.cgi/poky/">https://git.yoctoproject.org/cgi/cgit.cgi/poky/</a>                 | dunfell             | b47125666fe44e491ce9a4ecadd1875bec9891db |
| meta-altera          | <a href="https://github.com/kraj/meta-altera.git">https://github.com/kraj/meta-altera.git</a>                                 | dunfell             | 237cd5ecd28491dbcff16d8d64662d3b56ac30df |
| linux -socfpga       | <a href="https://github.com/altera-opensource/linux-socfpga.git">https://github.com/altera-opensource/linux-socfpga.git</a>   | socfpga-5.4.124-lts | cdb318393975f4bf9a392fb15af74aad45c57245 |
| u-boot-socfpga       | <a href="https://github.com/altera-opensource/u-boot-socfpga.git">https://github.com/altera-opensource/u-boot-socfpga.git</a> | socfpga_v2021.04    | bdc9a4409de9cef4408eebd81196fd63887ac78f |

## Build Host

Yocto Project is supported in many Linux Distributions, this descriptions refers to Ubuntu 20.04 LTS. Information and requirements for other distributions can be found in the [Yocto Project Reference Manual](#).

## General requirements

This requirements are generally needed for Yocto Project in Ubuntu 20.04:

- free disk space: at least 50 GB
- required packages:

```
sudo apt install gawk wget git diffstat unzip texinfo gcc build-essential chrpath socat cpio \
python3 python3-pip python3-pexpect xz-utils
debianautils iputils-ping python3-git python3-jinja2 \
libegl1-mesa libsdl1.2-dev pylint3 xterm python3-
subunit mesa-common-dev
```

## (optional) VM with supported Linux OS

If you do not have installed Linux OS on your host computer, you can optionally run a VM with a supported Linux OS:

- e.g. with OracleVM:
  - VM Setup:
    - RAM:  $\geq 8$  GB
    - CPU:  $\geq 4$
    - HDD: 200 GB dynamically
      - ubuntu-20.04-desktop-amd64.iso
      - install vm guest additions
    - Network: network bridge
    - optional: add shared folder, enable drag and drop
  - Note the [general requirements](#)

## Install Yocto Project

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1. Create and navigate to the yocto directory:

```
mkdir yocto && cd yocto
```

2. Clone the Yocto Project sources:

```
git clone -b dunfell https://git.yoctoproject.org/git/poky
```

## Create a project for an Intel SoC/FPGA device

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The following steps are required to create an image for the Intel SoC/FPGA devices:

1. For Intel SoC/FPGA devices you need the meta-layer 'meta-altera'. Run following command to clone this meta-layer from github into the 'poky' folder:

```
cd poky
git clone -b dunfell https://github.com/kraj/meta-altera.git
```

2. Run the oe-init-build-env script to initialize the environment:

```
source oe-init-build-env
```

3. Add meta-altera layer to *path/to/yocto/poky/build/conf/bblayers.conf*:

```
bitbake-layers add-layer ../meta-altera
```

4. Modify the *path/to/yocto/poky/build/conf/local.conf* file:
  - a. Remove default configuration of the MACHINE variable and set it to a supported machine (see [meta-altera/conf/machine](#) for more information) of meta-altera layer e.g 'cyclone5':

```
sed -i '/^MACHINE/s/MACHINE/#MACHINE/g' conf/local.conf
echo -e '\nMACHINE = "cyclone5"' >> conf/local.conf
```

- b. Set the preferred linux kernel version (see [meta-altera/recipes-kernel/linux](#) for other linux kernel versions):

```
echo -e '\nPREFERRED_PROVIDER_virtual/kernel = "linux-altera-lts"' >> conf/local.conf
echo -e 'PREFERRED_VERSION_linux-altera-lts = "5.4%"' >> conf/local.conf
```

- c. Set the preferred u-boot version (see [meta-altera/recipes-bsp/u-boot](#) for other u-boot versions):

```
echo -e '\nPREFERRED_VERSION_u-boot-socfpga = "v2021.04%"' >> conf/local.conf
```

5. Build the image:

```
bitbake core-image-minimal
```

The first run of this command can take several hours.

The generated files such as the u-boot file, kernel file or the complete Image (.wic file) are stored in `/yocto/poky/build/tmp/deploy/images/<MACHINE>/.`

6. Follow the steps described in [Reference Designs with Yocto - Intel SoC FPGAs#Copy .wic file to SD card](#) to copy the .wic file to the SD card.

## References

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1. [Yocto Project Reference Manual](#)
2. [Yocto Project Quick Build](#)
3. [OpenEmbedded Layer Index](#)